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## MEANINGFULNESS OF ACADEMIC MIGRANTS' EDUCATION, ITS ASSESSMENT AND MODELING ON IT-BASED TECHNOLOGIES <sup>1</sup>

*The article is devoted to the relevant problems of educational migration flows both in the real and virtual environment. The article discusses the positive and negative experience with virtual platforms in Russia and abroad. Particular attention is paid to the cultural and cognitive characteristics of the students belonging to the Generation Z, which requires the creation of entirely different instruments for implementing the educational process. The authors propose the method of creation, control and evaluation of feedback in the process of virtual educational migration using the latest IT- technologies that are utilized to create ultra-fast feedback and allow to bring new technologies into the learning process. In this scheme, the student is no longer a passive listener, but an active creator of new knowledge. The methodical research toolkit includes the mathematical, engineering, information methods of processing the results, including computer simulation. The testing of methodological tools was held at the University of Economics in Bratislava (Slovakia). These results confirm the possibility of the new method of providing feedback. This enable to improve the training quality of students, who are the members of the educational migration flows. Moreover, the training and examining may start at courses on adaptation, enabling to pre-determine the necessary competencies. In addition, it is cost-effective to limit the real presence of foreign lecturers at the host university to a certain minimum, followed by the support for virtual feedback. However, the use of IT- technologies is not a sufficient factor in improving the quality of education and the level of progress achieved by the trainees, but it can be a good helper in the course of the examination, automation of the selected methods of control, as it is a more individualized approach to learning.*

**Keywords:** education, educational migration, modeling, virtual technologies, feedback, cost effective, incentive effect, Generation Z, cultural and cognitive characteristics, highly skilled migration

### Introduction

In today's globalized world, the international migration flows are becoming increasingly important being a complex and multidimensional phenomenon. They have many characteristics and different directions, one of which is educational migration related to the internationalization of education and demand for highly qualified personnel. In fact, educational migration is a global intellectual capital both for a regional society and countries' associations as a whole.

Such interest and competition among the developed countries are due to shortages of highly skilled labor resources. According to experts, at the beginning of 21st century, the lack of specialists in such fields, as IT-technologies, was as follows: in the United States—850 thousand people, in Europe—2 million people. The high demand persists in such industries as aerospace,

aviation technologies, health and education. It is noted that the problem cannot be solved only through the expansion of native resources implementing new educational trends and retraining. Thus, due to the expansion of educational migration flows one can get a number of benefits from the dissemination of knowledge and satisfaction the demand for highly qualified specialists in the most advanced and fastest growing sectors of the economy.

Effective educational migration can be one of the mechanisms to solve existing problems, as its economic, political and social benefits are quite obvious. As a result, the export of education allows a country to:

- sell educational services on the international market;
- cut costs on primary and secondary education of future foreign entrants;
- use financial investments of foreign students for the learning process in the interests of local businesses, services and local budgets;

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- improve the gender and age structure of the population by attracting young people of reproductive age;

- obtain new citizens, entering the Russian society by the most profitable way—through the educational system, taking into account that in the course of their studies, they are integrated into the recipient society [1].

For example, today in the Ural Federal University (UrFU), there is a clearly expressed dynamics of educational migration increase. So, if in December 2014 to programs of higher education and the preparatory department there enrolled 1,229 foreign nationals from 60 countries, then since September 2015, there is about 2,000 from 86 countries. On a geographic basis, foreign students come mostly from the CIS countries (65 %), BRICS (18 %), Africa (5 %), Asia (except for China, 5 %), a small percentage of the EU and the US (3 %), Latin America (0.7 %) [2].

In general, educational migrants are a quite promising object for research. They have a high communicative resource and are more attractive to the host community than other migrants because they can have a positive impact on the development of the region or country. Consequently, the economic, social and political benefits of educational migration can and should be the basis for making the development of educational migration an important part of Russia's migration policy<sup>1</sup>.

However, success in the field of educational migration depends on concerted decisions and actions not only at the level of university management, but also at the level of regional and federal immigration policy. As a result, in the current socio-demographic situation, international education migration can be regarded as a significant resource of required highly skilled migration in general.

At the same time, one should take into account the characteristic features of today's younger generation, which is significantly different from previous generations. They are often called Generation Z (Digital Native) who was born between the early 1990s and the middle 2000s. The common features of Generation Z are a connection to each other due to such things as the Internet, YouTube, mobile phones, SMS, MP3-players, handheld devices such as PSP.

The research has shown that the training pays off precisely while using the most suitable for a person ways of presentation. So, D. Kolb concludes that people often study by using one of the following learning methods: 1. Specific practice: real experience enables a person to understand and feel what he/she has to do. 2. Reflection: involves the analysis of their own and others' experience. 3. Designing a model: the creation of a theory that makes sense to the observed phenomena. 4. The method of trials and errors: people tend to try different options, actively experimenting with new approaches [3, 4].

Education gives positive results in the case when using a combination of two or three methods. The invalidly chosen method of presentation makes the process tedious and creates a feeling of something alien.

In fact, taking into account the specificity of the cultural-cognitive profile of students and, as a consequence, the nature of their educational activity will meet the expectations of students and make the learning process more effective [5].

Thus, firstly, educational migration is a source of highly skilled labor forces and improving the quality of human capital. Secondly, there is a need of changing the approaches to teaching, as traditional "passive" approaches, based solely on memorizing and reproducing the material under study, can no longer fully meet the psychological type of students. In the life of Generation Z, there are many virtual gaming moments. Consequently, it is more and more necessary to introduce interactive and virtual technologies into the teaching process.

On the other hand, one must take into account some negative points of the problem.

Cross-border education in the virtual (remote) format can influence the content and quality of getting knowledge. While getting a real-time education abroad, its content is completely determined by the respective educational system.

Risks in the financial sector are associated with the redistribution of financial flows, access to financial resources and profit from the service provided. While importing educational services money payment of Russian consumers remains abroad and the Russian education system does not get the funds and, consequently, certain resources for development. While cross-border supplying of services and moving of service suppliers (lecturers), the refund also remains abroad. The payment received for services in the country is transferred to the organization that is "commercially present" in the country; then it is invested either in the host country or out of it.

<sup>1</sup> Vikhovanets, O. D. (2009). *Obrazovatel'naya migratsiya kak chast migratsionnoy politiki Rossii* [Educational migration as part of the migration policy of Russia]. *Doklad na zasedanii Nauchnogo Soveta FMS Rossii* [Report at the meeting of the Scientific Council of the Russian Federal Migration Service]. Retrieved from: <http://demoscope.ru/weekly/2009/0387/analit01.php> (date of access: 10.02.2015).

With the opening of foreign universities branches, the "brain drain" is already possible on the native market of educational services: the transition of the best Russian lecturers to these branches. And the best graduates can go abroad for internships, magistracy, postgraduate studies. Besides, many of them can permanently stay there.

Protection of intellectual property rights is no less significant because the results of intellectual work (textbooks, manuals, software, etc.) are widely available.

Nevertheless, several well-known scientists (D. Bell, A. Toffler, F. Fukuyama, S. Kapitsa) underline the role of intangible factors in modern economic theory and connect them with processes of IT implementation and creating knowledge society where professional training becomes the most important factor of economic growth. We can add that the essence of training itself also changes under the influence and prevalence of IT-technologies.

### **I. Educational (academic) migration: real vs. virtual**

At present, the competition of countries-exporters of education is entering a new round; there are new actors and in the coming decade, there is quite likely an educational division of the world. By 2025, the total number of students in the world will increase from 97 to 260 million people. According to the forecast of the UNESCO, at that time, there will be 5–7 million foreign students. Two-thirds of them will come from Asia. India and China will be leaders in the supply of students; therefore, the fight will precisely unfold for these regions<sup>1</sup>.

Experts predict that competition for international students as the most desirable category of migration will escalate. Overall, the world market of educational services is estimated at 50–60 billion dollars. Particularly active in attracting students are economically developed countries (UK, Germany, USA, France, Switzerland, and others). In particular, for the years, the US State Department has allocated substantial funds for the implementation of programs on the development of student exchanges and attraction of foreign students and lecturers for study and internships in the United States.

The UNESCO defines the category of foreign students (education migrants) as the persons admitted to undergo a specific program of study at institutions of higher education in the country where they do not have citizenship. This migration is classified as temporary, limited by the time required to pass the course. These migrants usually receive special student (not immigrant) visas, which often provide the right of entry with the accompanying family members, and limited employment opportunities<sup>2</sup>.

Both donors and host countries are interested in the training of their citizens abroad, as it often assumes part-organizing training costs. On a personal level, students and graduate students are greatly interested in getting an education abroad, as evidenced by the increase in their numbers, even while training at their own expense.

Moreover, small countries without diversifying education systems often have a higher mobility of students and graduate students who plan to stay and work in leading foreign research centers after graduation.

In order to attract foreign specialists and motivate left abroad compatriots, countries use a variety of complex measures<sup>3</sup>:

1. Implementation of special programs to encourage the inflow of certain professional categories.

2. Simplification of the procedure and conditions of employment for highly qualified specialists.

3. Provision of international students with the opportunity to work on the host territory during the training and continue working afterwards.

4. Creation of a special infrastructure. Taking into account the wide spread of English, other language countries provide courses in English. Considerable resources are invested in social and living conditions—libraries, campuses, transportation infrastructure.

5. The conclusion of agreements between countries and universities; the establishment of foreign branches contributes to the export of educational services. For example, American universities are opening their branches in Europe and Asia, which thus gain access to the American education in their own countries. In turn, American universities are expanding the number of students of whom they will be able to select the best

<sup>1</sup> Ryazantsev, S. V. (2010). *Mezhdunarodnyy rynek truda i mezhdunarodnaya migratsiya* [World labor market and international migration]. Retrieved from: <http://biz-books.biz/book-upravlenie-personalom/mirovoy-ryinok-truda-mejdunarodnaya.html> (date of access: 4.09 2015).

<sup>2</sup> Ryazantsev, S. V. (2010). *Mezhdunarodnyy rynek truda i mezhdunarodnaya migratsiya* [World labor market and international migration]. Retrieved from: <http://biz-books.biz/book-upravlenie-personalom/mirovoy-ryinok-truda-mejdunarodnaya.html> (date of access: 4.09 2015).

<sup>3</sup> Ibid.

candidates for further training and even work in the United States. Russian higher schools also have such experience (branches of Moscow State University, Peoples' Friendship University, etc. in the CIS countries).

6. Stimulation of the training with subsequent return to the homeland is done in order to protect the interests of donor countries. For example, China conducts a support of training abroad, encourage return, freedom of entry and exit, which corresponds to the policy of openness and international cooperation of China with other countries in the field of education.

7. Implementation of policies to facilitate the return of highly skilled migrants and the interest of foreign specialists to continue working abroad. For example, there is a developing infrastructure for the innovative business, sector of research and development activities, providing financial support.

In general, at the moment, despite the tightening of the rules of entry and stay on the territory of foreign states, migration policy in many countries are increasingly focused on attracting highly skilled professionals, graduate students, providing them with a number of privileges and preferences.

Absolutely new direction of training and attracting foreign specialists and students are massive open online courses (MOOC). In this regard, one can speak of a so-called virtual educational migration. Education not only changes the distribution channel, but also the high-quality format by digital channels of learning, such as gamification, simulators, virtual reality 3D. Virtual education is also considered as one of the variants of the selection of talented students for future job offers.

Virtual technologies allow creating flexible individual training scenarios tailored to the rate of assimilation of each student. Moreover, with the help of web cameras one can monitor non-verbal communication, and using smart phone or "smart" watch—even a change in the physical state of a student. It allows keeping a time track of losing the focus, adapting and optimizing the flow of information [6].

At the same time, experts have warned of a possible change of control over education to several leading universities, mainly Anglo-Saxon, which are able to select the best specialists around the world.

MOOC are electronic learning courses, including video lectures with subtitles, presentations, infographics, textual lecture notes, homework, virtual labs, tests and final examinations. Unlike traditional lectures video materials are presented

in 5–10 minutes fragments (corresponding to clip material perception by new generation). While training there are actively used forums for communication between students and lecturers. MOOC are created by most of the leading universities in the world.

Thus, the world's leading universities aggressively use new technologies to increase their share of the education market. Any universities could include courses of the best lecturers in their programs. In addition, the development of methods for analyzing large data turns MOOC into a unique research platform.

However, there are several problems with the use of MOOC platforms. For example, it is impossible to teach virtually all specialties (e.g., the field of medicine). Due to the lack of real communication there is a loss of socialization in training. "Although, perhaps, for the generation of gadgets online, communication skills and training will be an important part of the socialization at the growing popularity of virtual communication and remote work" [7].

Another problem is a small percentage of students who receive certificates. "For many students MOOC is not a tool for professional education but the kind of intellectual entertainment for the expanding horizons" [7].

Apart offered educational courses for MOOC platforms, there are problems of expanding of the geographical influence and language localization. For example, Coursera has launched a project for translating their courses into other languages. The company ABBYY Language Services has become its Russian partner, who provides a platform for the translation.

At the same time MOOC platforms are tools for cultural influence. Thus, two-thirds of Coursera students are foreigners, including the Russians, who actively explore the language, culture and values of other countries.

"The theme of the struggle for cultural influence is particularly relevant for Russia, since the liberalization of education with its transition to the online sharply complicate the transition of traditional values. Moreover, MOOC fight not only for the souls and values, but also brains. It is an effective tool for the "drain" of the most successful students into the world's leading universities" [7].

In mid-September 2015, the strongest universities in Russia presented a wide audience a joint project—the National Platform of Open Education (openedu.ru), having 46 courses in basic areas studied in Russian universities. The Ural Federal University offers 13 online courses—from "Self-Management" to "Mechanical Engineering".



Open education gives students the chance to choose individual learning paths. In addition, on the platform, there are used modern technologies to develop the necessary professional competencies in the form of simulators, games and alike, which are more understandable and familiar to today's younger generation. There may be a blended learning (both virtual and real). ... In the future, the platform will receive an additional directory of online projects for team working from the representatives of business; there will be developed mobile applications, improved teaching methods, the ability to get a master degree [8].

Consequently, it is possible to determine the advantages and some disadvantages (in the particular context, they may transfer into advantages) of online learning. They include: free subject choice and the schedule of the study, interactive teaching methods, adequate to cognitive abilities of today's students, the lower cost of educational services vs. lack of the personal contact with the lecturer (but it may be considered as a new kind of socialization in a virtual environment), quality equipment and Internet connection.

Thus, in the modern education system, there are clearly visible new trends that require new approaches and methods to preserve the competitiveness of both universities and teaching staff.

Therefore, one can speak about a cross-border higher education and internationalization of universities, i.e. education received when lecturers, students, programs, universities cross national borders. Universities are integrated, i.e. developing dynamically in order to adapt to a rapidly and continuously changing environment [9].

In addition, universities need to take into account the cultural characteristics of foreign students, whose number according to experts tends to increase.

Hence, considering the demographic situation in Russia, the number of Russian students has a tendency to decrease. To reduce the negative effect of decreasing the total number of students in Russian universities by 2025, they have to increase the number of foreign citizens. If the annual rate of the increase of foreign citizens in Russian universities remains at current levels (4–5 %), by comparison with the 2009/2010 academic year (76.6 thousand people) then to 2025–2026 academic year, their number in Russian higher education may be more than doubled (167.3 thousand people) [10].

Besides, there is a possible entry of foreign providers of education services to local markets. As for the real learning environment, Russia's approach to the commitments on modes of supply

of educational services in many ways similar to the approach taken in the United States and the European Union. On the one hand, it is characterized by removing restrictions on market access for cross-border supply and consumption abroad. On the other hand, it includes restrictions on the conditions for foreign suppliers of these services. Such an approach will neutralize concerns about the full opening of the educational sector to foreign investors.

Hence, the preventive measure is the introduction of control over the provision of educational services by foreign partners. However, for example, in connection with the opening of a branch of the University of California in Yerevan (Armenia), a large outflow of students from national universities is not observed.

The University of California (American University of Armenia) offers postgraduate education in various fields of business, management, engineering, law, etc., parallel to the established research centers. The exchange between lecturers and students is carried out on the basis of intellectual openness. The purpose of the university is to prepare graduates who will play a constructive role in the socio-economic development of the Republic of Armenia and the region. The use of English as the language of instruction is designed to facilitate communication between graduates and their counterparts around the world, as well as to attract lecturers and students from other countries. Therefore, in this context, it is correct to speak of the benefits that are derived from the possible risks of cooperation with foreign partners in the sphere of education.

On the other hand, cross-border education is often in a virtual (remote) format, which can influence the content and quality of getting knowledge. Foreign lecturers are generally quite independent in carrying out the methods and content of ongoing training. Accordingly, there must be a high level of qualification requirements for foreign lecturers.

Thus, in the existing context one can talk about an innovative information and learning environment (ILE) as a system-organized set of information, technical, educational software, inextricably linked with an individual as the subject of the educational process. ILE accumulates all national cultures and on the whole it can be considered as macro environment, and in a particular way—as an immediate social environment, i.e. the microenvironment [5].

Therefore, expanding educational migration, both real and virtual, and also cognitive characteristics of Generation Z, preferring the virtual and

creative forms of work, requires designing of new educational trajectories. Particularly noteworthy are such learning technologies, in which students take an active part in the proposed activities.

## II. Computer simulation of educational migration cases

One of the main components of the active adaptation model of educational migration is the formation of the educational system and its forms and, in particular, forms of post-graduate education (life-long learning). In this model, the feedback in the education process and its assessment plays an important role. It is important not only from the educational point of view of the final result, but also in relation to the correction of the educational content and forms. One can assume that educational migrants have originally owned the basic skills to work with information and communication means, in particular, the modern technology of mobile telephony [12].

Therefore, it is natural and appropriate in the process of transmitting information and knowledge to use e-support and e-learning, which has a number of advantages [11]:

- relatively easy way to obtain training materials;
- flexibility in curriculum development, quick and easy update of educational training courses;
- effectiveness of communication between lecturers and students;
- geographically unlimited training, individual approach and progress in students training;
- electronic register of actions and measures in the assessment of students' knowledge;
- remote access to the lecturer;
- long-term reduction in direct and indirect costs for the organization and management of education;
- implementation of training in concrete and specific conditions in production and non-production companies.

The main disadvantages in this process are:

- labor-intensive processes of training courses design;
- limited practical skills;
- limited direct interaction between lecturers and students;
- access to computers connected to the Internet with the necessary data rates.

Additional features typically include:

- Self-study, in which one can use multimedia programs with educational topics stored on CD-ROM or DVD-ROM. The method base is students' exposing of the specific training schedule, and an agreed plan of studies, because training is carried

out without the contact with the lecturer. The biggest advantage of this method is its flexibility. The disadvantage is the risk of non-transparency in the form of educational materials processing by students.

— Online courses via the Internet and Intranet also have a form of self-study by the university and other educational portals with a minimum requirement for the registration of the user. There can be used the methods of direct access with direct attachment of an educational portal on the Internet. One can work by the off-line method, in which students download materials from the educational website and save it to their computer. However, at this kind of training, there is a need of students' high motivation and strong will.

— Training with the lecturer-leader is carried out on-line, synchronously and in real time. The most suitable form is the use of videoconferencing systems, a modern information tool, that is used for video and audio connection for two or more participants, enable to share data presented [12].

Thus, on-line education has certain advantages, but the main problem is the establishment of feedback and assessment activities on the basis of IT-technologies.

The learning process, objectives and ways to achieve them can be compared with certain simplifications to a technical control system. One of the main tasks of the control processes is to create a proper feedback which can not only maintain the controlled system in the sustainable state but also achieve the desired result. In the technical sphere, there are developed different approaches to creating effective feedback for linear and nonlinear systems. The learning process is aimed at getting certain objectives to be achieved within the given timeframe. Consequently, the learning process can be viewed as a system that has many features in common with technical systems.

The purpose of the section is to disclose the concept of feedback in the learning process and its implementation with the use of modern information and communication technologies.

In the process of the machine or person's control, one must not only set a goal of the activity, but also check the goal achievement. In the case of deviations from the intended goal, one needs to change the input value to the controlled system [13].

In practice, there may be a few cases of the process development: the system detects a deviation, and outputs a one-time impact of moderate intensity; the system provides a short impact and a few small ones, which are summed up; the system strongly reacts to the deviation, and then gives

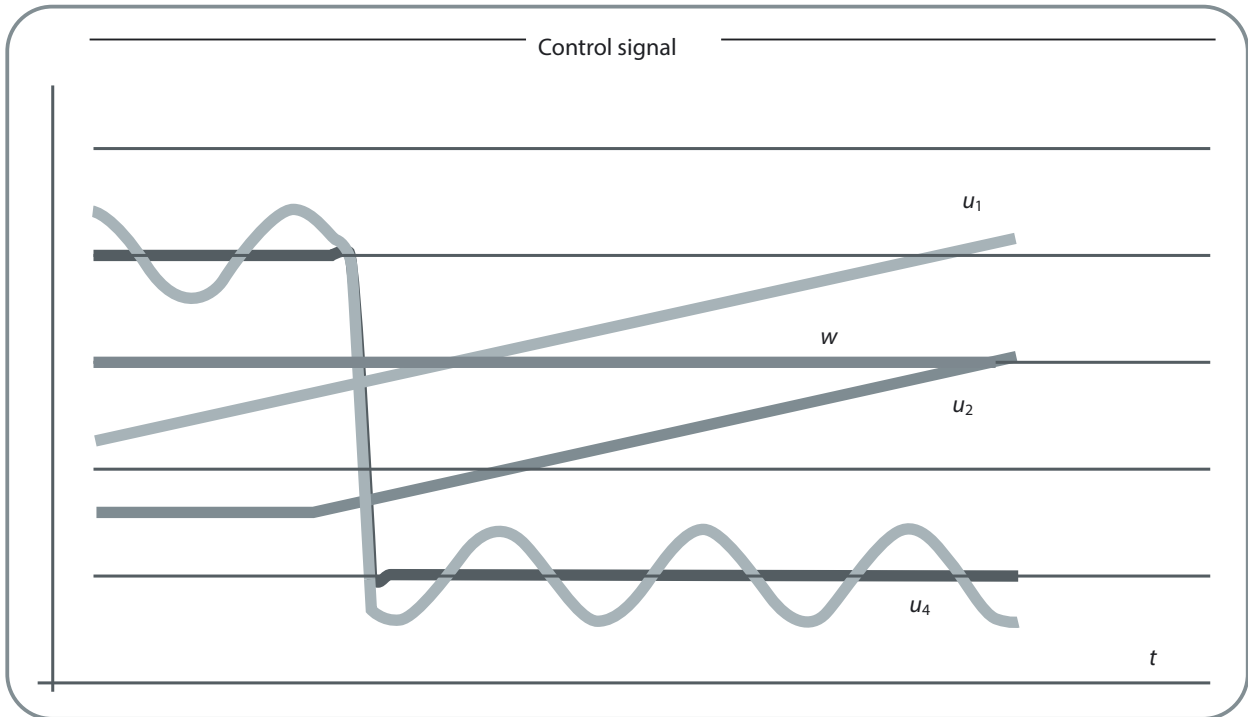


Fig. 1. Change of control signal

a moderate impact and several integrating small impacts In (Fig. 1) there are different types of control signal /  $u_1, u_2, u_3, u_4$  / to achieve the results of desired value /  $w$  /.

Depending on the system, strength, impact duration and deviation magnitude, there can be achieved several results. The most significant result is a noticeable gradual tightening of the sys-

tem to the desired result. The less acceptable result is the goal achievement with minor fluctuations. Typically, these variations require more energy input and / or may result in a violation of the system stability. If the impact is not enough tightening may continue for a long time and does not bring a positive result. The most unacceptable result is too much excitation of the system and the

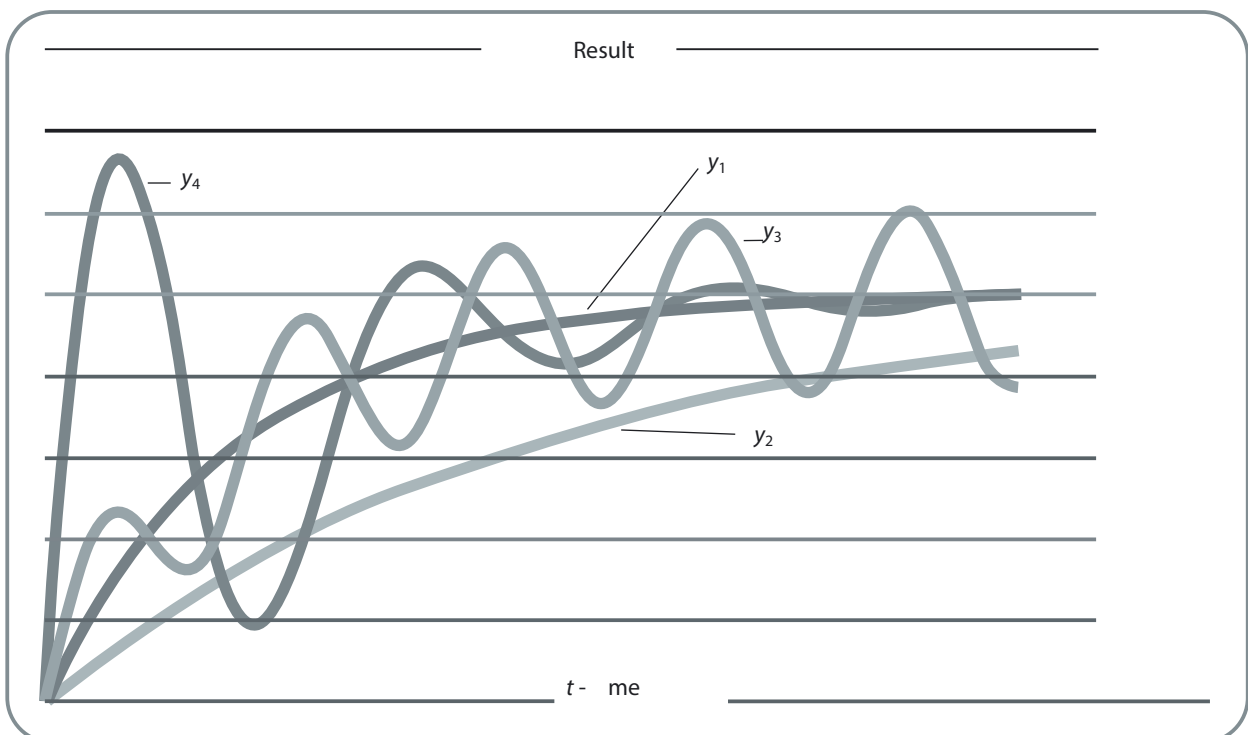


Fig. 2. System reaction to signal impact

violation of its sustainability. It shows various shapes  $y_1, y_2, y_3, y_4$  / changing the output / results achievement / under the influence of the input variable to achieve the desired result  $w$  / (Fig. 2).

The main task of the control theory is the selection of the successful impact on the system. In technology, there are many methods of selecting the correct impact to preserve sustainability and achieve the objectives. It often happens that we reach only the first part—the sustainability and only then try to change a little the objective and achieve the modified one.

Learning control system is shown in Figure 3 (Fig. 3), where  $U$ —lecturer;  $S$ —student;  $w$ —object of learning;  $y$ —learning outcomes;  $e$ —deviation;  $v_1$ —environmental impact on the lecturer;  $v_2$ —environmental impact on the student;  $u_1$ —student's activity control (Fig. 3).

Based on the many studies carried out in the period 2000–2015 (University of Economics, Bratislava, Slovakia), it can be said that the technical and educational systems are quite similar. The problem is only in determining the correct approach to learning. In the process of learning as a measurement of the knowledge level, one can monitor both the students' reaction in the classroom and select one of the motivations, i.e. a test in order to stimulate and determine the level of their knowledge. One can spend a complex test and / or intermittently apply the whole range of test instruments and incentives [14].

Thus, it is necessary to consider, as in the technical system, the magnitude, direction and frequency of selected stimuli. The wrong selection of these elements may have negative consequences. Too many tasks, assignments, tests, presentations, various consultations can lead to the students' and sometimes even lecturers' fatigue and the disintegration of the system.

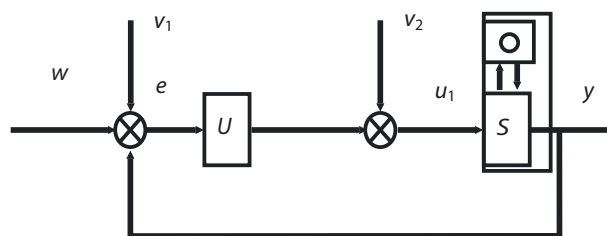
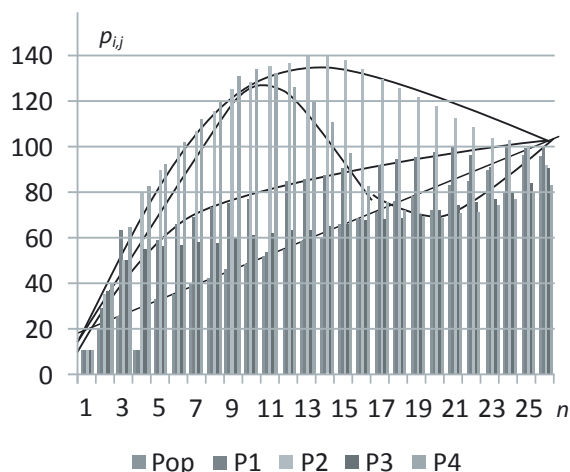


Fig. 3. Learning Control System

Therefore, every human activity is to be implemented with optimal labor costs. If the plane under the curve is considered as an equivalent to students' work, it is necessary to motivate them so that the costs will be minimal (Fig. 4).

So, there must not be set a lot of tasks, but such assignments and tests using modern tools (chat, forums, presentations, formative testing by computer systems, etc.), when the area under the curve is minimal, but students reach the desired result.

To determine the number and range of separate elements, it is necessary to determine the improvement in students' results depending on the use of a stimulating element. For the calculation of the impact of the given element on the final result one can apply the following equation:

$$P_i = \sum_j^n p_{i,j}, \text{ or } P_i = \text{mod}(p_{i,j}), \quad (1)$$

where  $i$ —stimuli coefficient,  $j$ —a student,  $n$ —number of students,  $P$ —value of stimuli impact on training result.

After selecting the values of  $P$ , one can select so many stimulating elements and in such an amount to achieve the set objectives cost-effectively.

Currently, to achieve very fast and efficiently the result desired, it is necessary to break the process into several smaller processes and then to add a stimulus. In the case of partial failure of achiev-

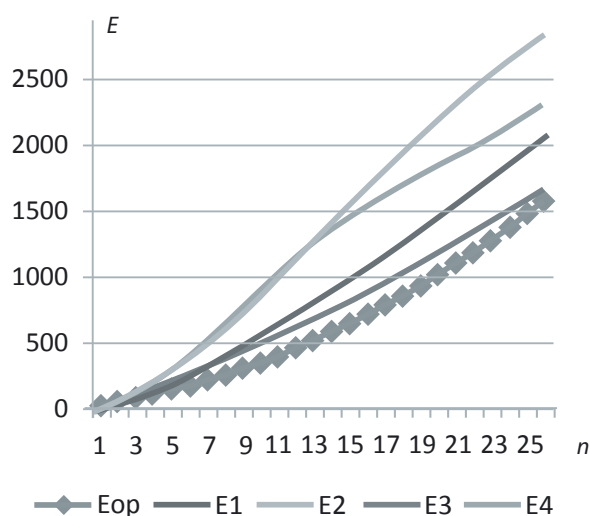


Fig. 4. Changes in expended energy  $E$  comparing to task  $P$



ing objectives, it is necessary to add another stimulus.

Application of some ideas of control engineering systems theory can reduce the time to prove that work. For example, the position of the plane minimum under the control curve has already been proved, so lecturers only need to determine the increment used for each element of feedback.

As for solving the problem there must be more research, then for the implementation, it is necessary to unite lecturers from many countries using modern technologies that can be GRID and CLOUD ones, where test systems, working forums, students' chats, the results of experiments, educational materials, etc. are discussed.

The use of IT-technologies in teaching not only facilitates the work of lecturers, but also has an impact on the learning process. The ability to quickly find the necessary information, the possibility of rapid communication between the participants of the educational process can lead to a change in the learning process. The ability to implement multiple types of feedback can also lead to changes in the learning process and delivering lectures [15].

It is a new methodology with using IT-technologies explaining the new educational material, promoting the audience's motivation, which is especially important with increasing the motivation of young people with new technologies and their capabilities, without which they cannot imagine their existence. With the help of these technologies, they are communicating with their friends, use them for payments, listening to music, provide information about where they are, create their own nets of friends, etc.

The role of feedback is to provide information on the knowledge level and understanding of new material directly in the learning process. At the moment, lecturers have the opportunity to change the ways and methods of their work; can explain incomprehensible in more detail or not to spend time on something that is already known to everybody. The resulting additional time is used for the transfer of knowledge from other areas of science.

Since the implementation of feedback by classical methods is not rapid enough, we can use the technologies with which students prefer to work. For this purpose, a small application to mobile phones is designed, and the lecturer can make a presentation directly into a number of issues. Students vote and on the basis of their replies the lecturer receives full information about students' knowledge. The great advantage of this system is the feedback when the lecturer receives a response from all students and each student votes on their own, independently of the others.

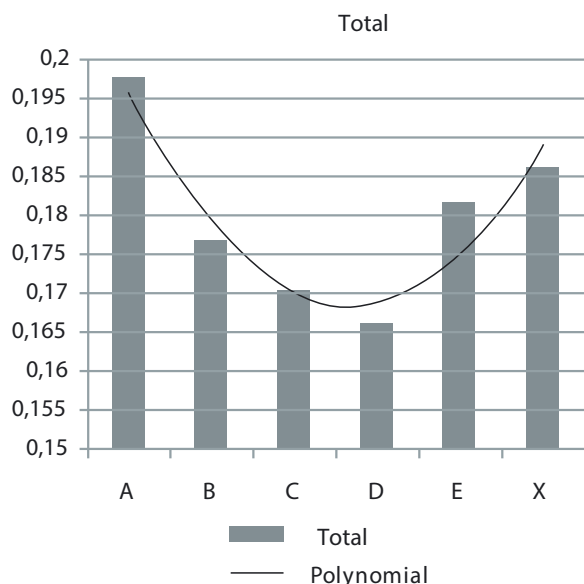
If we compare the classical scheme of learning with the proposed method, it is possible to say, in the first case the explanation presents the first theme, you can set 1–2 control issues and move on to the following topics with a certain risk of students' misunderstanding. In the second case, at first, one defines a drawing, diagram or leading questions, but gets the opinion of all students. Further, based on existing knowledge, there is assessed and explained a correct answer with analyzing errors. The work involves all students, and the lecturer has an idea about the general level of knowledge and transfers to the following topics. In this scheme, the student is no longer a passive listener, but an active creator of new knowledge. The use of this technique will allow full use of students' available knowledge [16].

The research of the impact of the introduction of continuous feedback with the application of Learning Management System (LMS) Moodle has been realized in the University of Economics in Bratislava (Slovakia). The results of this research confirm the possibilities of the new method of supporting feedback improving the quality of students' training [17].

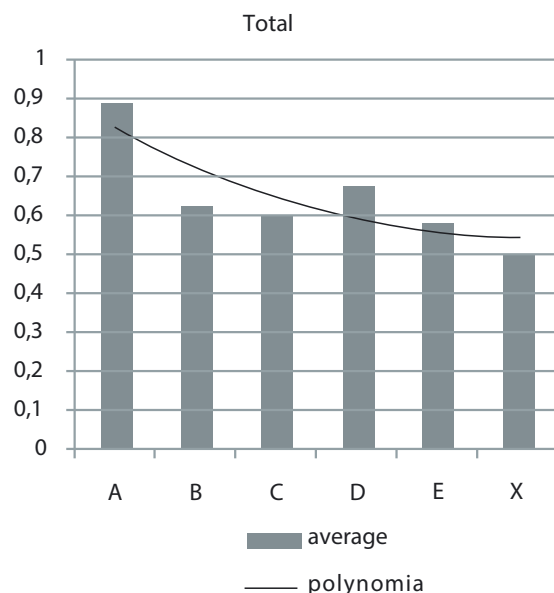
The research engaged 430 students for 2 years. During each semester, students solve several tasks with the use of various types using LMS Moodle. Then there were calculated the main statistical parameters of the results depending on the serial number of the task. The tested parameters were the number of students, solving the task, the mean value of the results achieved, the deviation of the correlation coefficient with the total value of the result achieved, calculated connections of the results achieved and assessment at the exam. We assume that the more progress achieved — a relative value, the better the grade obtained in the exam. Values achievements of students were obtained from the information system of the University Economics in Bratislava (Fig. 5, 6).

Based on the research, one can create several hypotheses related to the development of new methods for application of IT-technologies in the learning process not only of university students but also students from the educational migrants. From these results, it can be assumed that in the process of learning the first tasks lead to improved learning outcomes, but further tasks have lower performance and also increases the deviation of the results achieved from the average. Consequently, it is necessary to find a key to determine the optimal number of tasks.

When considering the dependency of progress in the training and exam, it can be assumed that the results achieved are sufficient grounds to achieve



**Fig. 5.** Dependence of results achieved and assessment, 1<sup>st</sup> year



**Fig. 6.** Dependence of results achieved and assessment, 2<sup>nd</sup> year

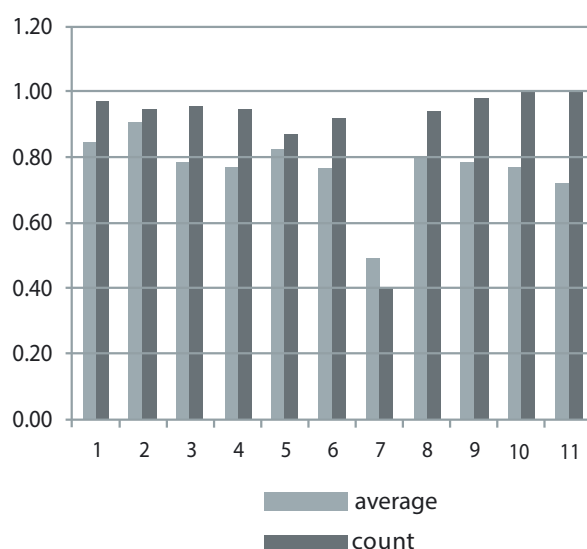
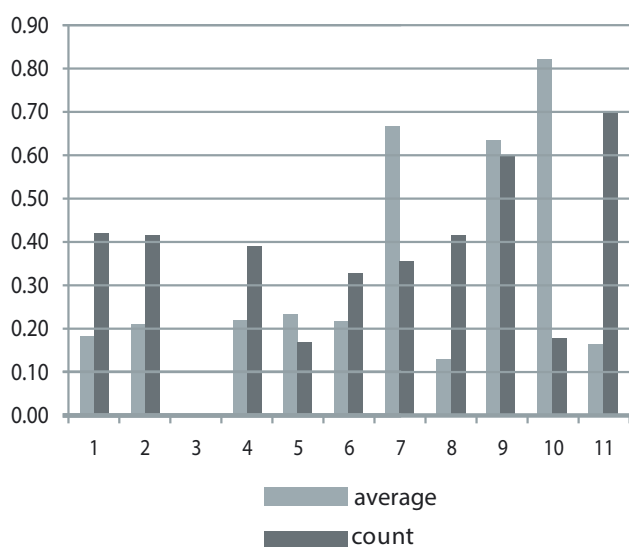
good results in examinations. However, some issues are increasing the number of grades in the LMS system, but the low result in the exam. This phenomenon may be due to increased self-confidence of students. The following year, the students were warned that, despite the good results, they need to pay attention to preparation before the exam. It led to the improvement of students' performance, and there is a higher correlation coefficient for the final assessment and the results.

Based on the results shown in the graph (Fig. 7), which indicates the possible dependence of the results achieved on the number of decisions one can make a hypothesis about improving student outcomes, depending on the increasing num-

ber of students, solving this type of tasks. The figure shows the following values: the average value of the results achieved and the number of students solved the task.

We can admit the growth in the average value of the results achieved, depending on the amount / share / of students to solve the given task. In the first year, the task solving growth is observed, depending on the order of tasks. In the second year, there are even more positive results due to the uniform training of students.

At the same time, the use of IT-technologies is not enough evidence to improve the quality of education and level of results achieved by the students. It is assumed that IT- technologies can be



**Fig. 7.** Dependence of achieved results on number of solutions (1<sup>st</sup> year vs. 2<sup>nd</sup> year)

a good support in the course of the examination, automation of selected methods of control, individual approach to learning. Therefore, it is necessary to pay attention to the creation of methods of IT-technologies application in education on the basis of more research [18].

On the other hand, the use of these systems could be one of the tools for teaching migrants at adaptation courses even during the stay pending a decision whether to grant the right of residence in another country. Persons without leaving their country can show their competences, which can lead to a faster decision whether to grant a visa.

But there is another problem. The development of international co-operation in the active mode requires the long-term presence of foreign lecturers at the partner university. It is economically difficult, and lecturers may not always be absent at their universities for a long time. It is the use of modern IT-technologies that allows them to spend part of the time in one university and then the other without compromising the quality of work [19].

The practical use of the above-mentioned method was carried out with the participation of the foreign lecturer from Kazakhstan in the educational process of the University of Economics in Bratislava in both off-, and on-line regimes. The main part of the lectures and workshops was realized by the foreign lecturer during the stay at the university for a month. Further training took place by distance learning in full-time once a week. In these consultations, it was possible to check the students' knowledge with the help of short tasks that were solved in the mode of direct connection to the selected server.

All students could be seen and heard, the requests could be checked in a chat, and the results of these requests are on the server database system. If necessary, one could use the program Teamviewer to view the contents of a student computer screen. All the tasks the students solved were on the server Oracle, which was installed on the server kultan.euba.sk:8080/apex or on the server MySQL installed on site hostinger.ru. Electronic verification and registration of the student's work made it impossible just to stay in the classroom but demanded high activities.

Based on the results achieved by students during the semester, one can add or remove tasks. The exam takes place in a fully on-line mode and contains both a theoretical part and practical one. Since students are not in the same room, the exam tasks should be formulated in such a way that they cannot be solved by CtrlC CtrlV. The practical part of the exam takes place in the mode of di-

rect connection to the server of the selected system. Students can choose the server on which they work better. The lecturer has an ability to check the performance of each student by means of the direct access to the desktop. The entire exam takes place under the supervision of the video camera, and the students already know that the exam is recorded. So, if in the classical exam the lecturer can distract or look the other part of the audience, the camera will not.

E-courses and methods of their implementation can be used in international cooperation with the active involvement of lecturers from different countries. Thus, one can manage joint training courses to improve the general level of education and reduce costs.

Based on these results, it has been decided to reduce the presence of foreign professors in the university in real mode, as it is enough for a lecturer to be present for two weeks at the beginning of the academic year. During this time, the lecturer delivers introductory lectures and holds introductory practical assignments. At the same time, there are created all the passwords for the access to the system taking into account the time shift between two countries.

### III. Economic Effect of Academic Migration

The economic effect of academic migration is determined by a number of parameters.

As far as financial benefits, one should take into account that students from the CIS countries pay as much as Russian students. Tuition fees for Russian students increase every year by about 5.5 %. However, in 2016 in conditions of the severe economic crisis, the Ministry of Education has recommended not to increase the fees.

Moreover, according to the agreement on education between Russia, the Republic of Kazakhstan and Belarus their students are trained on the budgetary basis. Students from far abroad pay 20 % plus to the price determined for the current year for the Russian students. Payment increase is due to additional costs for their residence registration and support on the territory of Russia, which is carried out by the university. In any case, in Russia tuition fees for foreigners are much lower than in European countries or America. So, the Russian education is rather attractive for foreign students in the long run.

In determining the benefit from enrolling of academic migrants, one should take into account the demographic situation in Russia, i.e. the annual decrease of Russian students as a whole, as well as problems of internal migration, when part of potential enrollees from Ekaterinburg and

other cities of Russia go to the central universities in Moscow and St. Petersburg. It creates an internal "brain drain" with the release of vacant training places in the periphery. This fact determines the number of problems. Firstly, there are possible financial problems for universities. Secondly, the possible release of the teaching staff and, accordingly, firing lecturers, or decreasing their academic load, which leads to a reduction in already low salaries. Thirdly, in the long term, internal academic migration will reduce the labor force in a number of industries in the cities of the academic migrants' outcome, as in most cases they stay in the central cities of Russia, or continue their education abroad.

Thus, in addition to financial benefits, international academic migration can compensate a small number of Russian enrollees, internal loss of the potential enrollees, as well as provide jobs for lecturers. In the long term, perhaps someone from academic migrants will remain in the country of study (e.g. Russia) and will be able to fill the vacancies of highly qualified personnel.

An additional option for solving financial problems and employment can be a virtual academic migration that at the development of national virtual platforms (MOOC) can greatly exceed the number of real enrollees. Thus, on the newly established UrFU platform, there are registered about 3,500 students. Accordingly, in the university, they create special virtual training courses. On the one hand, they reduce the academic load of lecturers by the training courses technical support, but, on the other hand, they increase the load for the creation and updating of the modern learning content, which is impossible without engaging the highly qualified academic staff. Nowadays, we have a kind of transition period, and it is difficult to predict the amount of lecturers engaged and released. In most cases it will depend on the lecturers' desire and possibilities.

There are problems with lecturers' trips to deliver lectures abroad due to the need of replacement of missing staff. Virtual migration could help in this case too, since students could listen to previously recorded and filmed lectures with the help of tutors. On the other hand, lecturers can go for a short time for the basic lectures in a foreign university, and conduct practical training and testing on-line, after returning to the university in their home country.

As far as the financial component, according to the estimates of technical developers in the UrFU, the average cost of creating an academic course is 500,000 rubles, which is released from the Program of competitiveness increase in the UrFU.

The lecturers get about half the amount (250,000 rubles including taxes) for the creation of the content. They can get it immediately or get royalties for a certain period of time, which is an indicator of improving the material well-being. The remaining amount is distributed among the technical course developers, thus providing employment and salaries to more categories of workers. After the course, students can pass a virtual exam to obtain a certificate for only 1,000 rubles. But with the increasing number of those wishing to obtain a certificate, the university may have a considerable amount of money. So, nowadays in the UrFU a maximum amount of virtual students is 3,500. So,  $1,000 \times 3,500 = 3,500,000$  million rubles. A part of them may be used for a salary increase at least for those lectures who are engaged in the new academic process.

Approximately the same situation is in foreign universities. Thus, foreign students can raise incomes of universities and at the same time education can be made available for them. For example, the cost of one semester for a foreign student is 2,000–3,000 Euros. If they create a group of 20 students, the university can get an addition of 40–60 thousand Euros per semester. As it is mentioned above, universities can economize on lecturers' trips (University of Economics, Bratislava, Slovakia).

Thus, if the real academic migration can, on the one hand, create a number of problems: students' outflows; reduced academic load and firing of the lecturers staff; temporary migration of lecturers abroad, which is associated with problems of employment and restoring labor resources; the virtual academic migration can help solve them with a positive economic effect. At the same time, for students' savings, there are no living and transportation expenses and the cost of on-line courses is much low than off-line. But in conditions of the severe competition of universities all over the world, there is a need of creating modern academic (educational) courses corresponding to cultural and cognitive preferences of the new generation of students.

### Conclusion

After analyzing theoretical and practical provisions relating to the academic migration flows, we have come to the following conclusions:

1. Effective academic migration can be one of the drivers for the solution of a number of socio-economic challenges: the acquisition of highly qualified specialists in reducing the cost for their training, the use of foreign students' financial in-



vestments in the interest of local budgets, the sale of educational services at the international level.

2. Attracting foreign students creates a special kind of competition. To expand the influence and selection of the most promising candidates for highly skilled migration leading universities around the world widely use virtual learning platforms, i.e. one can talk about a virtual educational (academic) migration.

3. The emergence of the new forms of learning both the real and virtual requires new approaches in creating training programs, taking into account the features of the cultural and cognitive profile of Generation Z in order to meet the expectations of students. Invalidly chosen method of presentation makes the learning process tiresome and creates a feeling of something alien.

4. There are a number of problems when using virtual platforms. Virtually, one cannot teach all specialties, there is a loss of socializing function of real learning, geographically expanding the influence of other cultures and language localization.

5. Properly designed open (virtual) education gives a chance to select an individual learning path, use of IT-technologies and blended learning (virtual and real).

6. One of the important issues is to support the feedback (lecturer-student-lecturer), to define its model and possible ways of its implementation. Modeling of the processes of feedback is possible by the analogy with the modeling of the technical control system.

7. The main objective of the feedback control is the selection of the most successful impact on the system. The wrong selection of stimuli may have negative consequences. Therefore, the implementation of activities should take place with the best labor costs associated with the use of IT-technologies, with which the Generation Z prefers to work.

8. Use of these systems may be one of the tools for teaching migrants at virtual adaptation courses when they prepare to move to another country. Thus, they can show their professional competencies that promote faster decision whether to grant a residence permit and training.

9. With the creation of modern virtual educational platforms and programs economically feasible to limit the real presence of foreign lecturers at the host university to a certain minimum, followed by the virtual feedback support.

Thus, the education system is entering a new paradigm of real and virtual education, due to the interaction of international actors in this process, which requires the development of new educational courses and programs taking into account the cultural and cognitive features of Generation Z.

As far as other problems mentioned in the introduction, it should be noticed that it is impossible to solve them at once as they are of a complex character. Thus, academic migration is a two-way process. Some migrants immigrate while others—emigrate. In the first case, the society can get some finance, in the second—lose. On the one hand, development of virtual education can release some labor force; on the other, it can promote some new categories of employment. The problem of the protection of intellectual property rights is open to discussion. All in all complex problems need complex solutions on multidisciplinary, i.e. economic, legal, educational, cultural, financial and other bases. The aim of our article is to show the new trend in redistribution between real and virtual academic migration and its possible benefits as the intangible thing influence the tangible ones, including economic matters. It is impossible to show all the aspects in the frame of one article, so the authors continue working on the topic presented.

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